Download the Dataset

https://www.kaggle.com/code/kredy10/simple-lstm-for-text-classification/data

Import required library

```
from keras_preprocessing.sequence import pad_sequences
import pandas as pd
import numpy as np
import re
import collections
import contractions
import seaborn as sns
import matplotlib.pyplot as plt
plt.style.use('dark_background')
from statistics import mode
import nltk
from nltk.stem import WordNetLemmatizer
from nltk.corpus import stopwords
import warnings
warnings.simplefilter(action='ignore', category=Warning)
import keras
from keras.layers import Dense, Embedding, LSTM, Dropout
from keras.models import Sequential, load_model
from keras.preprocessing.text import Tokenizer
```

Read dataset and do pre-processing

```
df = pd.read_csv("spam.csv", encoding='latin-1')
df.head()
```

```
     v1                                                 v2 Unnamed: 2  \
0   ham  Go until jurong point, crazy.. Available only ...        NaN   

1   ham                      Ok lar... Joking wif u oni...        NaN   

2  spam  Free entry in 2 a wkly comp to win FA Cup fina...        NaN   

3   ham  U dun say so early hor... U c already then say...        NaN   

4   ham  Nah I don't think he goes to usf, he lives aro...        NaN   


  Unnamed: 3 Unnamed: 4  
0        NaN        NaN  
1        NaN        NaN  
```

```
2        NaN        NaN
3        NaN        NaN
4        NaN        NaN
```

```
df.shape
```

```
(5572, 5)
```

```
df.drop(["Unnamed: 2", "Unnamed: 3", "Unnamed: 4"], axis=1,
inplace=True)
```

```
df.columns = ["Category","Tweet"]
df.head()
```

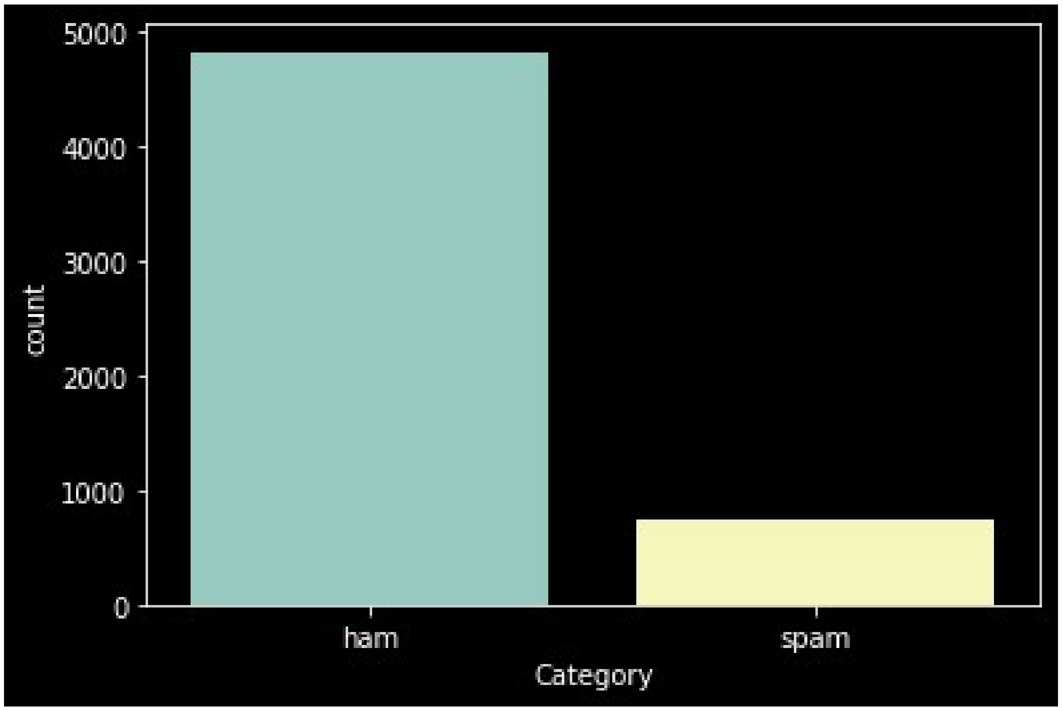
```
  Category                                              Tweet
0      ham  Go until jurong point, crazy.. Available only ...
1      ham                      Ok lar... Joking wif u oni...
2     spam  Free entry in 2 a wkly comp to win FA Cup fina...
3      ham  U dun say so early hor... U c already then say...
4      ham  Nah I don't think he goes to usf, he lives aro...
```

```
df.isnull().sum()
```

```
Category    0
Tweet       0
dtype: int64
```

```
sns.countplot(x=df['Category'])
```

```
<AxesSubplot:xlabel='Category', ylabel='count'>
```



```
from sklearn.preprocessing import LabelEncoder
en = LabelEncoder()
y = en.fit_transform(df["Category"])
```

```
tokenizer = Tokenizer()
tokenizer.fit_on_texts(df['Tweet'])
text_to_sequence = tokenizer.texts_to_sequences(df['Tweet'])
```

```
max_length_sequence = max([len(i) for i in text_to_sequence])
padded_sms_sequence = pad_sequences(text_to_sequence,
maxlen=max_length_sequence,
                                    padding = "pre")
TOT_SIZE = len(tokenizer.word_index)+1
```

Create Model

```
lstm_model = Sequential()
```

Add Layers (LSTM, Dense-(Hidden Layers), Output)

```
lstm_model.add(Embedding(TOT_SIZE, 32,
input_length=max_length_sequence))
lstm_model.add(LSTM(100))
lstm_model.add(Dropout(0.4))
lstm_model.add(Dense(20, activation="relu"))
lstm_model.add(Dropout(0.3))
lstm_model.add(Dense(1, activation = "sigmoid"))
```

```
lstm_model.summary()
```

```
Model: "sequential"

_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 embedding (Embedding)       (None, 189, 32)           285472    
                                                                 
 lstm (LSTM)                 (None, 100)               53200     
                                                                 
 dropout (Dropout)           (None, 100)               0         
                                                                 
 dense (Dense)               (None, 20)                2020      
                                                                 
 dropout_1 (Dropout)         (None, 20)                0         
                                                                 
 dense_1 (Dense)             (None, 1)                 21        
                                                                 
=================================================================
Total params: 340,713
Trainable params: 340,713
```

```
Non-trainable params: 0
_________________________________________________________________
```

Compile the Model

```
lstm_model.compile(loss = "binary_crossentropy", optimizer = "adam",
metrics = ["accuracy"])
```

Fit the Model

```
lstm_model.fit(padded_sms_sequence, y, epochs = 10,
validation_split=0.2, batch_size=16)
```

```
Epoch 1/10
279/279 [==============================] - 40s 133ms/step - loss:
0.1688 - accuracy: 0.9522 - val_loss: 0.0606 - val_accuracy: 0.9857
Epoch 2/10
279/279 [==============================] - 37s 131ms/step - loss:
0.0326 - accuracy: 0.9917 - val_loss: 0.0590 - val_accuracy: 0.9865
Epoch 3/10
279/279 [==============================] - 37s 132ms/step - loss:
0.0108 - accuracy: 0.9975 - val_loss: 0.0480 - val_accuracy: 0.9874
Epoch 4/10
279/279 [==============================] - 37s 132ms/step - loss:
0.0068 - accuracy: 0.9991 - val_loss: 0.0970 - val_accuracy: 0.9776
Epoch 5/10
279/279 [==============================] - 37s 131ms/step - loss:
0.0076 - accuracy: 0.9978 - val_loss: 0.0762 - val_accuracy: 0.9803
Epoch 6/10
279/279 [==============================] - 37s 132ms/step - loss:
0.0055 - accuracy: 0.9993 - val_loss: 0.0489 - val_accuracy: 0.9874
Epoch 7/10
279/279 [==============================] - 37s 131ms/step - loss:
0.0018 - accuracy: 1.0000 - val_loss: 0.0634 - val_accuracy: 0.9848
Epoch 8/10
279/279 [==============================] - 37s 132ms/step - loss:
2.8042e-04 - accuracy: 1.0000 - val_loss: 0.0760 - val_accuracy:
0.9901
Epoch 9/10
279/279 [==============================] - 39s 140ms/step - loss:
3.0002e-04 - accuracy: 1.0000 - val_loss: 0.0797 - val_accuracy:
0.9883
Epoch 10/10
279/279 [==============================] - 39s 138ms/step - loss:
1.4242e-04 - accuracy: 1.0000 - val_loss: 0.0906 - val_accuracy:
0.9892

<keras.callbacks.History at 0x1beadc4a380>
```

Save The Model

```
lstm_model.save(r'D:\IBM Project\spam_classifier.h5')
```

Test The Model

```
model=load_model(r'D:\IBM Project\spam_classifier.h5')

text='Urgent UR awarded a complimentary trip to EuroDisinc Trav,
Aco&Entry41 Or å£1000. To claim txt DIS to 87121
18+6*å£1.50(moreFrmMob. ShrAcomOrSglSuplt)10, LS1 3AJ'
text = tokenizer.texts_to_sequences(text)
max_length = max([len(i) for i in text])
padded_sms = pad_sequences(text, maxlen=max_length,
                                    padding = "pre")

prediction = np.squeeze(model.predict(padded_sms))
classes_x = (prediction > 0.5).astype("int32")

mode_val=mode(classes_x)
if(mode_val==1):
      print("Ham")
else:
      print("Spam")
```

```
6/6 [==============================] - 0s 4ms/step
Spam
```